FEDERATED MALAY STATES.

REPORT OF THE SECRETARY FOR AGRICULTURE, STRAITS SETTLEMENTS AND FEDERATED MALAY STATES, FOR THE YEAR 1922.

STAFF.

1. In February the post of Director of Agriculture was abolished, and Mr. A. S. Haynes of the Malayan Civil Service took over charge of the department as Acting Secretary for Agriculture, Straits Settlements and Federated Malay States, on 8th February, 1922.

2. Mr. Lewton-Brain, the former Director of Agriculture, was appointed Technical Adviser in April on his return from leave. It is with very deep regret that I have to record his death suddenly from malignant malaria at Kuala Lumpur on 25th June. He had been appointed Director of Agriculture in October, 1910, after service in Barbados and elsewhere, and had held the post up to the time of his appointment as Technical Adviser in April. His loss was deeply felt by every member of the department who had served under him.

3. The following changes in and additions to the staff took place during the year:

CHEMICAL DIVISION.—Capt. B. J. Eaton, O.B.E., who had acted as Director of Agriculture until 8th February, resumed charge of the division from Mr. R. O. Bishop, M.B.E., on that date.

INSPECTION DIVISION.—Mr. A. G. G. Ellis went on leave from Johore on 5th August and resigned the service in November.

Mr. A. E. C. Doscas from Negri Sembilan was seconded for service as Inspector of Agriculture, Johore, vice Mr. Ellis.

Mr. W. H. Barnes, who had been employed as a Special Field Officer, was appointed temporarily to act as Assistant Agricultural Inspector, Negri Sembilan, vice Mr. Doscas, on 3rd August.

MYCOLOGICAL DIVISION.—Mr. F. R. Mason assumed duty as an Assistant Mycologist on 6th March on arrival from England.

ENTOMOLOGICAL DIVISION.—Mr. W. Malcolm Miller began duties as Acting Assistant Entomologist on 1st January on a temporary engagement.

Mr. B. A. R. Gater took up the post of Assistant Entomologist on 18th December on arrival from England.

AGRICULTURAL DIVISION.—Mr. J. Lambourne, Superintendent, Government Plantations, went on leave on 13th July and Mr. T. D. Marsh, Assistant Agriculturist, took his place as Manager of Castleton Estate.

AGRICULTURAL INSTRUCTION DIVISION.—Capt. J. M. Howlett, M.C., was appointed an Agricultural Instructor and assumed duty on 4th March.

4. The Advisory Committee was composed of the following members:

Mr. A. S. Haynes, Acting Secretary for Agriculture, *Chairman*.

The Hon'ble Mr. R. C. M. Kindersley.

Mr. W. S. Cookson.

Mr. W. R. Shelton-Agar.

Mr. S. Wierman.

Mr. M. J. Kennaway.

Mr. R. Napier Hendrie.

Thanks are due to the unofficial members for attendance at meetings in Kuala Lumpur and for the time given to matters connected with the work of the Committee.

RUBBER.

5. For nine months of the year the low prices for rubber that had prevailed during 1921 continued to cause serious difficulties to producers. With the news that a scheme for restriction of export had been sanctioned prices rose in October and continued to improve until the end of the year. In Annexure A is a table which gives the Singapore market prices for the different grades for each month of 1922.

6. The high price commanded by rubber in the past has not been without harmful effects. Apart from being an important factor in the local high cost of living, it has led to a certain degree of extravagance in the administration of large estates; it has caused rubber properties to be regarded as a source for acquiring large profits easily and rapidly, not as valuable assets which should be carefully preserved; it has led landowners to plant up unsuitable land with rubber so that in some of the coastal districts low lying land with a high water table, suitable for padi or certain annual crops, is often found to contain stunted and unhealthy rubber trees with an inadequate root system, that cannot yield a profit unless the price of rubber is unduly high; it has attracted the Malay peasant from rice fields which have been abandoned and fruit trees which have been felled; finally it has caused public interest to be centred on rubber cultivation and has led to the neglect of all other crops giving reliable but smaller profits.

7. The period of severe depression that now appears to have ended has done much to counteract some of these ills. Rubber companies of good standing have set their houses in order and have succeeded in producing rubber at a cost per pound that is believed to be lower than that obtaining in any other country. In some cases the upkeep of the estates has suffered, but instances of this are not very numerous. Padi cultivation has benefited and there has been much interest evinced in the possibilities of developing other crops.

8. Considerable attention has been given to measures for preventing the loss of the valuable top soil on estates. There has been a general policy of substituting cover crops for clean weeding, or of growing low grasses in strips on steep hill sides liable to wash, where cover crops cannot be established.

The increased use of soil covers should have a beneficial effect, not only on the rubber trees on the estates, but also on padi lands lying below estates since such lands have in several instances been rendered less productive by the accumulation of silt washed on to them from surrounding clean clearings.

9. The general systems of tapping now in favour on estates are more conservative than they have ever been: one cut on one-fourth or one-third of the tree tapped every other day is a common system, while daily tapping for periods of varying lengths followed by resting periods are also systems in common use. The value of alternate periods of tapping and resting has not as yet been fully determined.

10. Low prices caused cessation of tapping on many small holdings and resulted also in their neglect or even abandonment in numerous instances. On others, before restriction was introduced, the trees were excessively tapped to make up for the low price by increased yields. Cessation of tapping has had a useful effect on such diseases as black-stripe and mouldy-rot.

11. In November the Secretary for Agriculture was appointed Chairman of a Committee to enquire into the fairness of the standard production allowed in the case of small holdings. Two reports were submitted for the consideration of the Government.

In general it may be said that the yields of rubber from small holdings were found by the Committee to be considerably higher in a large number of cases than had been generally believed.

12. The planting community continues to be interested in the possibility of increasing the yield of individual rubber trees by bud-grafting from selected high-yielding mother trees. Many Planters have been making experimental buddings for the purpose of becoming proficient in the method and of training coolies should they be needed later. A few estates have established large areas of budded trees.

The recent work however of Dutch Scientists has shown that numerous difficulties remain to be overcome before this procedure can be relied upon to give satisfactory results on an estate scale, and also that it is unlikely that the excessively high yields once promised by this means will be realised. The work is still in an experimental stage requiring further investigation.

There is, however, every need for the active support of further experimental work.

The position as regards bud-grafting has been and is being commented on from time to time in the *Malayan Agricultural Journal*, the monthly organ of the department.

13. The Plant Physiologist continued his important work on the physiology of the rubber tree. His field work embraced records of individual tree yields, experimental "Double V" tapping, and the starting of experiments as to the effect of early and drastic thinning out. In the laboratory he studied properties of latex which may be expected to influence flow and yield, the state of Caoutchouc in latex, and non-proteid nitrogenous bodies.

14. The output of manufactured rubber goods, especially soles of boots and complete canvas boots and shoes with rubber soles, is increasing. The goods are to a considerable extent being exported to China.

One Chinese firm has bought up a number of rubber factories throughout the Federated Malay States.

It appears to me that the rubber growers, many of whom have very large cash resources, have missed a great opportunity in not co-operating to do this.

There are indications that the market in China for rubber soles will expand greatly, and this combined with China's vast population may result in the eventual consumption of a considerable amount of rubber with a considerable profit to the makers of the soles.

15. It would appear desirable to impress on rubber growers and others the importance of encouraging the use of crepe rubber soles (unvulcanised). Such soles have been found most satisfactory in actual use: they are light and springy, and they grip well and wear well. Further they contain 100 per cent. rubber and can be produced by any grower who in the ordinary course of his work produces crepe rubber. Here you have the grower turning out of his existing rubber factory with his existing machinery the complete article ready for attachment to the boot.

In view of reports that some bad and hastily turned out crepe rubber for soles has been put on the market, it would appear to be to the interest of makers of this kind of rubber to co-operate in securing that only a good standard quality is turned out; for the "bad" producer may damage the interests of the "good" producer, and incidentally of rubber growers as a whole, by getting this product a bad name and checking the demand for it.

The crepe rubber sole is finding a ready market in England, especially for sporting purposes; but it is curious and disappointing to find that shoes soled with it were not to be seen for sale in the European-owned shops of British Malaya.

16. As regards diseases of rubber, these are dealt with in some detail in the informative Reports of the Chief Agricultural Inspector and the Mycologist, which it is proposed to publish in the *Malayan Agricultural Journal*. I will touch on them only briefly in this report.

17. Of stem diseases, Pink disease (*Corticium salmonicolor B.* and *Br.*) was newly reported from 40 estates in the area covered by this report, making a total of 328 estates from which it has been reported. One thousand seven hundred and thirty-four notices were served requiring treatment of the disease; failure to comply with the notices led to 106 prosecutions, with 100 persons convicted, and fines amounting to $1,668.

The regular enforcement of routine control measures has kept the disease well in hand in most areas. The efforts of the Special Field Officers employed in the Ulu Selangor district proved effective; and the situation had so much improved by the end of June that it was possible to dispense with the services of these officers on the 30th of that month.

Demonstrations of the proper treatment were given and had good results.

A small pamphlet and standard instructions for the treatment of the disease to be attached to notices served under the Agricultural Pests Enactment were prepared by the Chief Agricultural Inspector and translated into Chinese, Tamil and Malay.

18. Of bark diseases, Mouldy-rot (*Sphaeronema fimbriatum*) was the most important. In Negri Sembilan the employment of the Special Field Officers was continued until the 30th of November, when it was felt that their work had had its full educative effect and that the control work could be left in the hands of the normal inspecting staff.

It has been impossible completely to eliminate the disease. This is partly due to the fact that the fungus possesses spores very resistant to drought which enable fresh infections in damp weather, even when the trees have been healthy for some time; and partly due to the fact that owing to poverty, small holders cannot be induced to cease tapping the trees, sick and healthy trees being tapped alike. In such circumstances the disease has always been present though kept under control by painting disinfectants.

19. Black-stripe (*Phytophthora sp.*), another bark disease is regarded as having been of little importance during the year though there were new outbreaks in the different States.

The bark affection, brown-bast, is noticeable everywhere on small holdings, where the affected trees have not been thinned out and heavy tapping still prevails. It is far less common than formerly on estates, probably owing to the more conservative tapping systems that are now universal.

20. Of root diseases, *Fomes lignosus*, Wet Rot (*Fomes pseudoferreus*), Dry Rot (*Ustulina zonata*) and brown root disease have been most important. In the Annual Report for 1921 attention was called to the fact that a thick cover crop on land not cleared of timber will assist the spread of fomes. This has been confirmed during 1922, and the Chief Agricultural Inspector states that it is certainly advisable to remove all lying timber before planting a cover crop.

The Mycologist draws attention to the importance of root diseases, which was emphasised by the department many years ago, and emphasises the probable loss of acreages to many old properties owing to neglect of this question.

COCONUTS.

21. In 1921 the price of copra varied from $10 to $13 a pikul (133⅓ lbs.). At the beginning of 1922 the price was about $11 a pikul, but it fell gradually and at the close of the year it was just over $9 a pikul. Nuts in the coastal districts cost two to three cents each in the kampongs and four to five cents on the market.

22. Annexure B contains a statement kindly supplied by the Commissioner, Trade and Customs, Federated Malay States, showing the export of copra from the Federated Malay States during the last three years. The increase in the figures during the last three years is of interest, and it is rather remarkable to note that the quantity exported in 1922 (928,619 pikuls) was more than double that exported in 1920 (419,988 pikuls). The State of Perak exports more than three times the amount combined from the other three States of the Federation. A further increase may be expected only after some time, as there are still areas of young palms not yet in bearing.

23. A leaflet was prepared by the Agricultural Chemist on the subject of the preparation and market for dessicated coconut; and during the year a factory for this product was opened in Province Wellesley and was operating successfully at the close of the year.

24. Though a few acres have been planted up with dwarf coconuts, the usual tall variety is generally preferred. At present more information is required regarding the yields to be obtained from dwarf palms over a period of years.

25. The preparation and marketing of copra from nuts grown on small holdings appears to offer a possible field for co-operative methods which might considerably benefit the grower.

At present most of such copra is prepared by local Chinese dealers, who take at least such middlemen's profits as well might go direct to the grower of the nuts.

26. Preliminary selection work on coconuts is in progress in the Federated Malay States, the chief object of the work being to increase the yields of copra per acre and to study the factors affecting yield.

27. Throughout the year the work of clearing up all dead palms, refuse and other accumulations suitable as breeding grounds for the black coconut beetle (*Oryctes rhinoceros*) and red-stripe weevil (*Rhynchophorus schach*) was steadily maintained In general good results were obtained, beetles being now far less numerous in the once badly infected areas, and the coconut trees often show an improvement in yield as a consequence.

More detailed information on pests and diseases is given in the report of the Chief Agricultural Inspector, to be published in the *Malayan Agricultural Journal.*

PADI.

28. I will preface my remarks under this heading by allusion to the fact that the rice debt incurred by the Governments of the Federated Malay States, the Straits Settlements and Johore during the period of food control amounted to some $42 million. This will perhaps help to focus attention on the valuable experimental work being carried on by the Economic Botanist at the Rice Experiment Station at Titi Serong in the Krian district of the State of Perak.

29. The Economic Botanist reports as follows:

"Experimental work with rice continued to be the main research carried on by this Division and the first five months of the year involved frequent and prolonged visits to the Titi Serong Experiment Station in Krian. The first three months were occupied with the checking, in the field, of the agricultural and botanical characters of all the strains of padi under trial and in preparations for the harvesting which did not begin until the last week of March and finished at the end of May. The Krian crop of 13,906,130 gantangs was less than the average of the last twelve years by 83,000 gantangs.

"The crop had a 'bumper' appearance until some two or three weeks prior to harvest when showery weather caused a considerable amount of lodging and germination of grain.

"The prolonged drought which necessitated a postponement of cultural operations at the beginning of the season, was the source of the trouble, for in the period February-March which as usual proved to be the dry period suitable for harvesting, the padi was very immature and the rainy weather began on 18th March and continued right up to the end of May, thus damaging the harvest materially. Had it been possible to perform cultural operations up to scheduled time the crop at harvest would have been higher by at least one million gantangs.

"During last season (1921-22) 120 pure strains representing six varieties, and being the best selections from an original collection of 1,300 strains, were tested at Titi Serong Experiment Station for yielding ability. Their comparison with each other and with padi grown from unselected seed is graphically portrayed in Annexure C. This curve for the variety Seraup ably demonstrates the superiority of selected over unselected seed, the mean yield of 97 pure strains of this variety being over 20 per cent. higher than the mean yield derived from unselected seed."

30. Small lots of the best pure strains were distributed to padi planters in various districts for tests under local conditions, and in most cases produced better crops than were derived from unselected local seed.

The value which padi planters put on these selected strains is shown by the fact that they were saved for seed and distributed amongst neighbouring cultivators without any encouragement from officers of the department and even without their knowledge. For example, a padi planter at bendang Ulu Papan in the Kuala Kangsar district planted up one-fifth of an acre with departmentally selected seed and the entire crop of 78 gantangs was distributed amongst 17 neighbouring cultivators whose lands, fully planted, were recently inspected by the Economic Botanist.

This natural distribution of selected seed is high testimony to its value.

31. Experiments with small power rice mills were carried out with a view to recommending mills for estate rice milling to encourage local production and to diminish the beri-beri menace.

32. In North Perak the growing crop was excellent, but the actual yield was reduced by wet weather at harvest.

In Negri Sembilan shortage of water soon after planting and heavy rain with floods at harvest time partly spoiled the crop in places.

In Pahang East the 1922-1923 padi crop promises to be good and well above the average for the East Coast.

33. The 1922-23 padi crop is reported by the Chief Agricultural Inspector as being remarkably free from pests generally speaking, very little serious damage being caused except by rats.

Nymphula depunctalis which had damaged the previous crop at Matang Road was looked for carefully early in the 1922 planting season. As soon as it appeared on the young plants in the nurseries, spraying machines were provided, and other control measures instituted with the co-operation of the District Officer and Executive Engineer.

Stem borers (*Schoenobius incertellus, Diatraea auricilia, etc.*), were present in Province Wellesley, Krian and Kuala Kangsar.

In Selangor advice given by Malay Officers to burn stubble after harvesting helped to control these pests.

Leptocorisa Varicornis.—This large bug which sucks the young grains of padi soon after the seed has set is known by the Malays in Province Wellesley as "Chenanggong" and elsewhere as "Pianggang". The Entomologist, who has devoted special attention during 1922 to the pests of padi, reports that this bug is forming one of the principal investigations in his Division of insects injurious to padi.

The most important result obtained was the wide variety of food plants used by this insect. This shows the necessity of keeping down grasses in the vicinity of padi areas, both when supporting padi and when fallow, in order to reduce the number of insects attacking the next padi crop.

Podops coarctata ("Bena Kura" or "Kutu Bruang" in Malay) were studied in detail by the Entomological Division. They were found in stubble in Perak South, thus proving that they can exist between crops. They did much damage in one area at Bandar, where mole crickets were also harmful.

RATS did much damage all over the country. Barium carbonate was sold to padi growers at cost price and judging by the demand did good work. But as poisoned rats die in their holes or in water and are not often seen, it is difficult to say how far the poison is effective. Traps also gave good results.

The Chief Agricultural Inspector remarks again that rat control would be assisted if padi planters would keep the land surrounding rice fields free from tall grass and undergrowth which shelter rats, and would also remove the mounds of earth so frequently seen in padi fields, in which rats can make holes above water level.

34. The position as regards padi cultivation is distinctly encouraging. The rice crisis when food control was necessary and in particular the rubber slump have been the main factors in causing the Malays to turn to their rice fields. Water control, the distribution of selected seed, and help in control of pests and diseases have contributed to demonstrate the possibility of better crops; and the profit obtained by padi planters from the best Krian lands arouses interest as it becomes better known.

Co-operative methods are helping to free the growers from the money lender and the middleman; and the Malays are already taking their crops to the mill for sale and securing for themselves the higher prices paid there instead of the lower prices paid by Chinese middlemen in the field. A journey through the Krian district during the padi harvest of March, 1922, when the rest of the country was suffering terribly from the depression in rubber and tin was an inspiring experience; the roads were lined with bullock carts laden with padi, fowls and ducks were plentiful in all the homesteads, and thriving coconuts were seen on every side. The whole scene was one of plenty and prosperity when depression and failure were apparent elsewhere.

35. In Kinta padi has been planted with some success where no padi grew before. In Selangor near Kuala Bernam a new block of 6,000 acres of padi land was surveyed into small holdings on which padi was planted; and the District Officer informs me that there are applicants who would combine to take up several more thousand acres.

His Highness the Sultan of Selangor has taken a personal interest in the planting of padi on 800 acres at Pulau Lumut; and this State which never had the settled padi-planting communities established in other parts of the Peninsula is now improving in that respect.

36. The Inspection Division, which now does some instruction as well as inspection work, has worked in co-operation with the Economic Botanist to start an experiment station in Malacca for selection and testing work and testing stations at Permatang Toh Glam in Province Wellesley and Talang bendang, Kuala Kangsar. The suitability of pure strains of padi from the Krian Experiment Station will be tested at these different stations; and if the results are satisfactory the testing stations will serve as demonstration plots. Further testing stations are to be established.

37. In Perak experiments are being started to ascertain if dredged mining land can be converted into good padi land by growing a succession of suitable green manures on it for several seasons. Dredges can lay out otherwise unsuitable land evenly and with a suitable top layer of slime which, with a proper admixture of humus from decaying vegetable matter should make useful padi soil. This line of work is of great importance.

38. The report of the Chief Agricultural Inspector gives further interesting information on the subject of padi which I regret cannot all be reproduced here; but it will be published in the *Malayan Agricultural Journal.*

39. Annexure D gives returns of the padi crops in the Federated Malay States, Straits Settlements and Unfederated Malay States.

OTHER CROPS AND PRODUCTS.

40. FRUIT:—The fruit season in the middle of the year was good generally except in Pahang West. Durians, mangosteens and rambutans were especially plentiful.

A large pineapple canning factory producing 20,000 tins of 1½ lbs. daliy was opened in Klang.

41. AFRICAN OIL PALM.—The crop gives promise of proving a commercial success on one estate in Selangor. A few other small estates are also planted with this crop.

42. CINCHONA.—The Assistant Economic Botanist visited Java early in the year to investigate methods of cultivation and manufacture of quinine, and his report was published in the *Malayan Agricultural Journal.* He also visited various hills in this country, including Cameron's Highlands, and found the latter to be very suited to the cultivation of *cinchona.*

43. Roselle.—One estate in Perak has grown this crop on a considerable scale with profit. There is now a definite market for the fibre. Its principal use locally is for the manufacture of rope.

Other estates have planted small areas experimentally or for seed, and small demonstration plots have been arranged for.

44. Groundnut.—It appears likely that the groundnut may prove a good crop for rotation with Roselle, and that groundnut oil may be produced profitably without any expensive machinery.

As British Malaya spends several million dollars annually in buying groundnut oil from other countries there is a ready market here.

45. Cotton is being grown on the Experimental Plantation at Serdang and the Government Plantation at Kuala Kangsar. The Economic Botanist, Mr. H. W. Jack, has given attention to this crop, and an article entitled "Cotton Experiments in Malaya" by him and the Assistant Economic Botanist, Mr. W. N. Sands, was published in the October, November and December number of the *Malayan Agricultural Journal* for 1922 (Vol. X, Nos. 10, 11 and 12). The conclusion was that long-staple cotton of good average quality can be grown in Malaya with a fair degree of success provided that due attention is given to cultivation, time of sowing and pest control.

Kapok (Malay "Kabu Kabu").—The Agricultural Instructor visited all the districts in Perak where trees are numerous. There are about 60,000 trees within a comparatively small area in Perak, but the Malays do little beyond taking such floss as they require for their own needs. In view of the fact that with "slump" conditions existing in the case of practically all raw materials the demand for and the price of kapok were increasing, efforts were made to awaken the interest of Malays in kapok and to organise the collection, cleaning and sale of the crop for 1923.

An investigation of the buoyancy of Malayan kapok showed that it conformed to the standards laid down by the Board of Trade for use in life-saving apparatus.

46. "Arghan."—The Arghan Company after giving up their concession of land at Rompin in Pahang transferred their plants to a nursery near Teluk Anson. Arghan has not yet been profitably grown in British Malaya, and the best local conditions for the plant and the fibre content of locally grown plants as well as other important matters have not yet been determined. The cultivation of this plant is therefore still in an experimental stage. Botanists have expressed the opinion that the plant is probably identical with the Columbian Pita (Ananas macrodontes?)

47. A feature of the year has been the large number of enquiries in connection with products other than rubber, and the Agricultural Chemist with his Assistants has been particularly busy on investigations relating thereto and in preparing special reports on various subjects.

Nipah Palm.—Alcohol investigations have assumed an important place. The Nipah palm appears to be the most promising source for the production of fuel or power alcohol, and the manufacture of sugar from this palm has also been investigated. Two syndicates have taken up land for the cultivation of the palm, and the department has had two small experimental areas reserved for it to obtain information on the growth and maturation period of the crop.

Lime Products.—A syndicate is planting up limes on an estate in Perak and advice and assistance has been given in connection with the manufacture of lime products.

Paper Pulps.—Samples of various kinds of paper pulp have been prepared and sent to England and to India for valuation and report.

48. The activities of the Chemical Division comprise also investigations of many oil seeds, oils and fats, various essential oils, fibres, forest products (resins and wood oils), fertilisers and soils. Over 100 soils were examined and reported on, and over 100 remained to be done at the end of the year.

AGRICULTURAL INSTRUCTION.

49. On 1st July, the provision of an Instruction Division was approved as a provisional and tentative arrangement to be reviewed on 1st July, 1923.

Mr. D. H. Grist was placed in charge of the Division. In general terms the new Division is to place the department more closely in touch with the Malay cultivator.

50. Certain duties in connection with instruction have also been given to officers of the Inspection Division, an arrangement which both avoids the heavy expense of providing an entire new instruction staff and also renders the work of the inspecting officers more interesting.

The inspecting officers (Assistant Agricultural Inspectors) are now expected to bring to the knowledge of the planter, and, in particular, of the Asiatic cultivator the results of the experimental work carried out on Government plantations and by the research officers at head-quarters. Such lines of work include the running of Experiment Stations for padi and possibly other crops; the establishment of padi testing stations to test the suitability of pure strains under varying local conditions; the planting of demonstration plots for pure strains of padi and for new crops likely to be suitable for small holders; the distribution of seed, especially selected padi seed; and the giving of advice on agricultural matters to small holders.

51. To obtain the best results all inspecting officers must gain the confidence and interest of those among whom they work. For this reason it is desirable to retain officers for as long as possible in the same areas and to avoid transfers, so that each officer may become personally known to those for whom he is working.

52. The beginning of this arrangement promises well, and the Chief Agricultural Inspector reports that no administrative difficulties likely to interfere with the smooth working of the scheme have, so far, been experienced.

53. The Agricultural Instructors deal more particularly with school gardening, publications in Malay, investigations on organization of local industries, literature for local shows, and arrangements for the periodical examinations of the Malay Officers in the department.

54. School Gardens.—After a survey of the schools of Selangor, Negri Sembilan and part of Pahang to select those which were most suitable for gardens, the Agricultural Instructor explained to the teachers concerned at meetings at Kuala Lumpur and Seremban the objects and methods of School Gardening.

Implements and planting material were provided, and by the end of the year eight schools in Selangor had started gardens.

55. Early in December the first number appeared of a *Malay Agricultural Bulletin* printed in the Arabic character and styled the *Warta Perusahaan Tanah*, 2,500 copies being printed. A copy was sent to each school in the country, and to Malay Chiefs, Malay Government Officers and other Malays of standing. The result has been encouraging. Letters were received from Malays in different parts of the country either thanking the department for the publication or asking for further advice on cultivation, pests and diseases and for the supply of seed.

56. Agricultural Shows in the district, for which there was provision in the Estimates, were not held for reasons of economy.

I am glad to be able to record that private effort is coming to the fore in this matter. The Negri Sembilan Agri-Horticultural Society is flourishing and held successful shows in Negri Sembilan; while in October the Malayan Agri-Horticultural Association came into being. This is a step in the direction of self-help, and represents in my opinion a useful attempt on the part of those interested in agriculture to do for themselves what for so many years it has been the custom to expect the Government to do for them.

GOVERNMENT PLANTATIONS.

57. Pondok Tanjong (Rubber).—Mr. F. W. McCormac was in charge throughout the year. The new clearing of 300 acres was not planted up, the planted area remaining at 271 acres of mature rubber.

A tapping experiment was inaugurated in July to test the relative value of the alternate day and periodic resting systems of tapping.

58. Kuala Tembeling (Rubber).—Capt. F. J. Ayris was manager throughout the year. No tapping was done in 1922 or in 1921: a census in December showed that 21,903 trees had attained a tappable size.

Most of the immature area is planted with *Centrosema plumieri*, and this leguminous plant produces an excellent cover on this type of land.

59. Castleton (Rubber).—Mr. J. Lambourne, Superintendent, Government Plantations, was in charge till 13th July, when he went on leave, and Mr. T. D. Marsh, Assistant Agriculturist, took his place.

The experiments on different systems of tapping, individual yield of trees, various methods of cultivation and the effects of thinning-out on yield of rubber were continued throughout the year.

A few small trial plots of minor economic crops interplanted amongst the coconuts (6½ acres) were laid down from time to time and the results of these trials carefully recorded.

60. Sapintas (Coconuts).—Mr. F.G. Parkin was in charge throughout the year: owing to the probable sale of this plantation his agreement as manager was terminated on the 31st October and his services retained at a reduced salary from that date.

Mr. F. J. Norman, Temporary Assistant, resigned on 5th of April, and for reasons of economy the post was not filled.

The total area of the plantation is 2,122½ acres, of which 938 acres are under coconuts and 88 under rubber.

All development work was suspended in view of the need for curtailing expenditure.

The general appearance and growth of both the old and young coconut areas showed considerable improvement.

The experiments with various leguminous and non-leguminous cover crops were continued.

61. Experimental Plantation, Serdang.—Mr. Lindsay Vears was in charge until the termination of his agreement on 13th June, when Mr. E. A. Curtler, Assistant Agriculturist, took over charge of the labour.

Mr. J. N. Milsum, Assistant Agriculturist, was in charge of the experimental work throughout the year and went to live on the plantation on the 1st August.

Mr. B. Bunting, Agriculturist, Government Plantations, who was responsible for the general supervision of the work of opening up and laying out of the plantation, paid regular weekly visits.

An area of about 350 acres of good flat land, particularly suitable for experimental work with annual crops, was added to the plantation during the year; this made the total area approximately 1,525 acres, half of which is hilly and the other half either flat or undulating.

At the close of the year roughly 450 acres of land were clean cleared of all timber and the major portion either planted or ready for planting. The greater part of this area having been ploughed by tractors the land was completely free of all roots and timber, making it most suitable for the cultivation of annual crops which require replanting periodically.

Draining operations were carried out, and the whole of the drainage system worked efficiently during the wet season.

Good progress was made in constructing roads and semi-permanent buildings.

The following are the approximate areas of the principal crops planted out at the end of the year:

African oil palm	50	acres
Kapok	50	,,
Sisal hemp	25	,,
Mauritius hemp	25	,,
Sugar cane (10 Malayan, 13 Javanese varieties)	25	,,
Coffee (5 varieties)	10	,,
Croton oil	9	,,
Candle nut	8	,,
Sugar palm	7	,,
Coca (cocaine)	5	,,
Manila hemp	4½	,,
Sea Island and Egyptian cottons	4	,,
Roselle fibre	2½	,,
Bananas (approximately 100 varieties)	2	,,

Altogether in the nursery and elsewhere there were roughly 100 different species of plants established on the plantations at the end of the year.

There were many visitors to this important plantation during the year and amongst the appreciative remarks made I would invite particular attention to those of the Hon'ble Mr. J. W. Campbell at the meeting of the Legislative Council in Singapore on 27th November, 1922.

MINOR EXPERIMENTAL PLANTATIONS.

62. The small plantations at Batu Tiga, Gunong Angsi and Juasseh (near Kuala Pilah) were abandoned during the year, as it was decided that they accomplished no useful purpose.

The Agriculturist remained in executive control of those in Kuala Lumpur and Kuala Kangsar. Mr. E. Mathieu, temporarily employed as a Superintendent, Government Plantations, lived on the Kuala Kangsar Plantation and did useful work in connection with Roselle. At the close of the year steps were taken to cut out all the rubber on the Kuala Kangsar Plantation.

63. Demonstrations of bud-grafting were arranged by the Agriculturist at Kuala Lumpur and on estates throughout the country, and this officer also visited many estates in connection with general agricultural matters.

64. In connection with the important question of food production, an endeavour is being made to encourage Chinese market gardeners and others to grow peas and beans. There is a large import of dried peas and beans into this country—they are seen in the usual small provision shops all over the Peninsula—and many of them are valuable foods and keep well. Mr. Mathieu at the Kuala Kangsar Plantation has been very successful with Lima beans (*Phaseolus lunatus*), and they can be generally recommended.

GENERAL.

65. Legislation.—In the Federated Malay States Enactments Nos. 9 and 27 of 1922 amending the Agricultural Pests Enactment (13 of 1913) were passed. Their effect was to substitute the appointment of Secretary for Agriculture for that of Director of Agriculture, and to abolish the special procedure laid down for certain coconut pests and bring them under the general provisions dealing with pests.

A rule regulating the importation of cotton plants into the Federated Malay States is under consideration.

66. Malayan Agricultural Journal.—From the beginning of the year the title of the *Agricultural Bulletin* was changed to *Malayan Agricultural Journal*. Owing to great pressure of work publication was delayed for some months, but the delay was being caught up at the end of the year.

In Annexure E to this report is an interesting note from the *Malay Mail* of 18th January, 1898. It is part of a memorandum by Mr. Leonard Wray, then Curator and State Geologist, Perak, stating how the first seeds of Para rubber were introduced into Perak and where they were planted; and I have added it to this report for purposes of record.

67. Water Hyacinth was adequately controlled in the Federated Malay States.

68. In September the Mycologist visited Sarawak at the request of that Government to advise on a serious outbreak of disease on pepper vines. The disease was identified and found to be a preventible one.

69. A number of enquiries were made of the Malay States Information Agency (88, Cannon Street, London, E.C. 4) in connection with economic products, their uses and markets and other matters; and the Agency was of considerable use to this department. Samples of many economic products were forwarded to the Agency.

70. In November the annual conference of the Malay officers of the department was held in Kuala Lumpur. Papers were read by Malay officers on "Improvement of Padi and Agriculture in Kedah", and by officers of the Co-operative Department on "Co-operation".

The Malay officers of the department decided to form a Thrift Society.

Raja Mahmud, Senior Agricultural Assistant, was seconded for service in Kedah at the request of that Government as Agricultural Officer there.

It is the endeavour of this department to encourage the Malay officers and train them with a view to their taking higher posts in the department. Several of them show considerable promise, and it is hoped where possible to try their capabilities in acting in some of the higher posts for which they may be suitable as openings occur.

71. With the inauguration of the new system by which the Assistant Agricultural Inspectors in the various States and Settlements add certain lines of instruction work to their duties as Inspectors of plant pests and diseases, a notable departure has been made. It is hoped that in time all classes interested in agriculture will come to regard the local agricultural officers as their natural guides, councillors and friends in all agricultural matters; and that the local officers will serve as useful links between the research officers at head-quarters in Kuala Lumpur and the planting community of all races throughout the country. As an aid to this end it is important that the Assistant Agricultural Inspectors keep in close touch with the District Officers, who are the interpreters of the people's needs and the pivot of the whole administration; and instructions have been given to the local agricultural officers to carry this out in practice.

I feel sure that the better the officers of the department and their work are known the more they will be used and appreciated.

72. The establishment of a Co-operative Department, of which Mr. Cavendish is in charge, has been a welcome movement. In an address, which Mr. Cavendish gave at the Annual Conference of Malay officers, he emphasised that the work of the Agricultural Department was directed rather towards the scientific and technical side of agriculture, whereas the Co-operative Department was concerned more with the economic side, to

which little attention had been paid hitherto. In this common task the practical planters must also join. During the year under review it has been one of the endeavours of the Department of Agriculture to get planters to co-operate with the department and with one another as opportunities offered and to bring planters in different parts of the country who are trying or interested in similar products into touch with one another, so that experience and knowledge be pooled. Where each one works for all there is greater chance of success, in spite of what may be commonly believed, than where each works only for himself. To take a concrete instance, in the case of a new industry like Roselle fibre, where it is desired to get a good name and a good market for the fibre, estates turning out good fibre may have their success turned to failure by estates turning out bad fibre and causing the new product to be neglected as worthless. Further, fibre merchants will not in any case be interested in a new product, where standard quality, reasonable quantity and regular supply cannot be guaranteed. Meagre supplies of uncertain quality at odd times will not interest merchants. In this connection the remarks on crepe rubber for soles in para. 17 of this report should be read.

My view of what is required in the case of a new industry such as Roselle fibre, or crepe rubber for soles or groundnut oil (for which there is a large local market) is that growers should immediately co-operate and pool their experience, each contributing something towards the success of all.

73. The Malaya-Borneo Exhibition in Singapore, at which His Royal Highness the Prince of Wales was present, gave the officers of the department a great deal of work in addition to their ordinary duties. The "Handbook of Malayan Agriculture" was prepared for it and proved useful to many enquirers. The Agricultural Exhibit which was highly praised on all sides did valuable work not only in showing the agricultural products of the Peninsula and the activities of the Agricultural Department, but also in focussing attention on new products which might be successfully cultivated in British Malaya.

Great credit for this is due to the committee of officers of the department presided over by Captain Eaton, O.B.E.

74. But in connection with new products it must always be borne in mind that successful cultivation is only the first step; the second, and more essential one, is successful sale. It is no good producing if you cannot sell at a profit. These remarks are not intended to discourage enterprise but to encourage clear thinking.

It is satisfactory to record that there is enterprise in the country; and it is pleasant to be able to report that the number of enquiries from persons eager for information on cultivating and marketing products other than rubber and coconuts has been a severe tax on the time and energy of the officers of the department who have responded with willingness and interest.

75. I have been much struck by the interesting and informative annual reports written by some of the Heads of Divisions. To incorporate their reports in this one would render it unduly bulky and would impose on the general reader much detailed information on various aspects of agriculture which are rather special than general. Yet some of the reports contain records of investigations and reviews of work done which should be on record and should be available to those sections of the public who are particularly interested in their several lines; and a perusal of them will illuminate the usefulness and value of the work performed by the various Divisions of the department, work which by its very nature cannot be brought to the notice of the public day by day.

It is proposed therefore to make a new departure by printing these reports in the *Malayan Agricultural Journal*, the monthly organ of the department.

76. It has been the custom for the department to send annually to each estate in British Malaya forms to be filled in by the estate showing the area under cultivation with various products, and then to compile and publish the figures. The replies from the estates were, however, never complete or very satisfactory, and many estates never replied at all. Out of 2,378 forms sent out in 1922 only 1,514 were returned filled in. It was considered that no good purpose could be served, and harm might result, from the publication of incomplete and misleading figures, and it was decided therefore that the department should send out no more forms.

77. My thanks are due to all those officers of the department who have, by tact, loyal co-operation and deep interest in their duties, aided in the smooth working of an administrative change in the department.

A. S. HAYNES.
Secretary for Agriculture, S.S. and F.M.S.

KUALA LUMPUR,
8th April, 1923.

ANNEXURE A.

(Paragraph 5 of Report.)

SINGAPORE RUBBER PRICES (1922).

Cents per lb.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Standard rubber sheet	30–37½	27–31	25½–27	27–28½	24–28½	24½–27½	25–26½	23¾–25	23–26¼	41¼	43¾–47	47–48⅓
Second quality ribbed sheet ...	25–37	24–30½	20–26	21–28	20–27½	17–27	22½–26	21–24¾	18½–26	23¾–39¾	34–46	41½–47¾
Standard first latex crepe ...	29½–37	27–31	25½–26½	27½–28½	24½–27¼	24½–27½	25–26½	24–25¾	23–23¼	40¼–40½	39¼–47	No sales.
Second quality latex crepe ...	24–37	22–30	18–26½	21–28	20–27	19–26½	21–26	20½–24¾	20–25¼	22¾–39½	36⅔–46	42¾–47½
Lower grade crepe	20–34	15½–27	15–23½	17–25½	15–25	13½–24½	16–23	16¾–23½	15¾–23¾	19–36½	29⅔–43	35–44½
Bark crepe	17½–30	15½–22½	14–21	17–22	15–19	12–21	15½–19	16–19¾	15¼–19	18¾–33½	29⅔–38¾	36¾–41½

ANNEXURE B.

(Paragraph 22 of Report.)

EXPORTS OF COPRA FROM FEDERATED MALAY STATES.

(*Supplied by Commissioner of Trade and Customs, Federated Malay States.*)

State.	Quantity in Pikuls.			Value in Dollars.		
	1920.	1921.	1922.	1920.	1921.	1922.
Perak	330,329	436,054	698,934	7,369,345	5,416,972	6,624,465
Selangor	82,225	163,516	214,266	1,697,393	2,054,315	1,982,730
Negri Sembilan	4,270	1,501	5,970	89,364	21,088	54,617
Pahang	3,164	7,269	9,449	60,484	77,326	83,753
Totals ...	419,988	608,340	928,619	9,216,586	7,569,701	8,745,565

NOTE.—1 pikul = 133⅓ lbs.

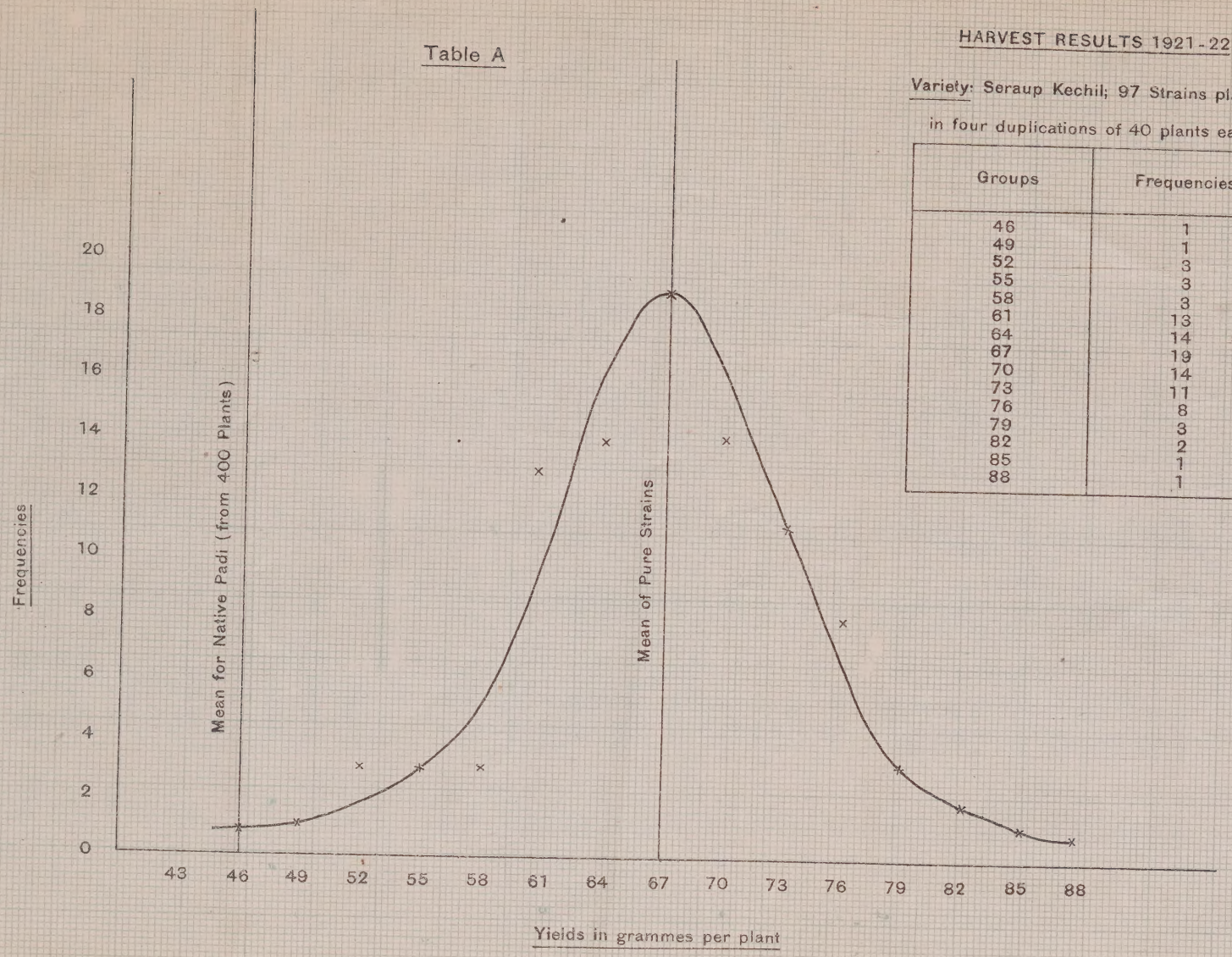
Annexure "C"
(para: 29 of Report)

HARVEST RESULTS 1921-22

Table A

Variety: Seraup Kechil; 97 Strains planted in four duplications of 40 plants each

Groups	Frequencies
46	1
49	1
52	3
55	3
58	3
61	13
64	14
67	19
70	14
73	11
76	8
79	3
82	2
85	1
88	1



Annexure D.

(Paragraph 39 of Report.)

"PADI CROPS, SEASON 1921–1922".

Federated Malay States.

District.	Wet.			Dry.		
	Area. Acres.	Gross yields in gantangs.	Average per acre.	Area. Acres.	Gross yields in gantangs.	Average per acre.
Upper Perak	4,149	1,098,140	265	1,330	179,129	134
Larut and Matang ...	10,701	1,958,392	183	1,563	149,101	95
Krian	54,627	13,906,130	254	243	19,700	81
Kuala Kangsar	14,955	3,814,416	255	2,665	393,944	147
Kinta	1,197	287,250	240	4,861	593,865	122
Batang Padang	643	109,992	171	7,638	624,183	82
Lower Perak	2,666	482,525	181	8,058	833,824	103
Total, Perak ...	88,938	21,656,845	244	26,358	2,793,746	106
Kuala Selangor	9,145	1,655,248	179	336	42,135	125
Ulu Selangor	994	83,429	84	2,702	230,293	78
Klang	834	166,810	200	350	10,000	28
Kuala Lumpur	848	76,303	90	652	42,293	65
Kuala Langat	81	10,125	125	246	12,425	50
Ulu Langat	2,913	709,500	243	535	82,500	154
Total, Selangor ...	14,815	2,701,415	182	4,821	419,646	87
Seremban	4,091	577,825	141	53	5,750	108
Jelebu	2,533	286,024	112	30	4,560	152
Kuala Pilah	14,598	1,759,487	120	11	1,890	172
Tampin	8,901	2,526,977	283	91	9,567	105
Coast	312	14,040	43	75	3,734	50
Total, N. Sembilan ...	30,435	5,164,353	170	260	25,501	98
Kuala Lipis	5,435	1,187,885	218	2,193	323,629	147
Raub	5,989	913,870	169	208	36,819	172
Pekan	2,749	451,274	164	803	50,726	126
Kuantan	1,439	129,155	90	248	24,185	97
Temerloh	10,632	1,880,808	177	259	27,570	106
Total, Pahang ...	26,244	4,562,992	136	3,711	462,929	124
Grand Total, F.M.S. ...	160,432	34,085,605	212	35,150	3,701,822	108
		Straits Settlements.				
Singapore	...	...	...	...	...	...
Penang	* 4,980	2,490,000	500†	...	...	...
Dindings	100	17,400	174	535	92,900	174
Malacca	26,409	8,486,024	321	...	...	...
P. Wellesley	30,000	10,141,000	340	1,000	150,000	150
Grand Total, S.S. ...	61,489	21,134,424	344	1,535	242,900	158
		Unfederated Malay States.				
Johore	8,959	1,066,670	119	6,116	418,469	68
Kelantan	179,500	33,900,000	188	160	24,000	150
Kedah	125,121	36,665,950	293	4,109	636,243	155
Trengganu	7,500	1,500,000	200	3,330	500,000	150
Perlis	29,587	5,841,120	198	36	6,080	168
Grand Total, U.M.S. ...	350,667	78,973,740	222	13,751	1,584,792	115
Grand Total, Malaya ...	572,588	134,193,769	234	50,436	5,529,514	110

* Revised figure. † Estimated: appears unduly high as an average.

ANNEXURE E.

(Paragraph 66 of Report.)

From the Malay Mail of 1898: 18th January, 1898.

NOTES ON RUBBER GROWING IN PERAK.

MEMORANDUM BY MR. L. WRAY, CURATOR AND STATE GEOLOGIST, PERAK.

The first seed of the Para rubber (Hevea brasiliensis) was introduced into Perak in the year 1882 by Sir Hugh Low, the then British Resident. It was sent to me to plant, but did not germinate, having been kept too long after picking. A second lot was received a short time after and was planted at Kuala Kangsar; so that the larger trees there are now about 14 years old.

In 1887 some seed was obtained from the Kuala Kangsar trees and planted in the Museum grounds, Taiping. The soil is very bad, the land having all been mined over, but still the trees have grown well and have attained, in the ten years which have elapsed since they were planted, a considerable size.

Finding that they grew so well I ventured, in 1891, to write to Sir F. A. Swettenham, the then British Resident of Perak, suggesting that they should be planted on waste lands, and, as a result, Mr. O. Marks, then Superintendent, Government Plantations, put out a number of trees at Kuala Kangsar, which are now about six years old and are doing very well. It is much to be regretted that more were not planted at that time, as by now they would be valuable not only as rubber but as seed producers.

The tree has also been planted at Parit Buntar, where it grows well. It is in the garden of the District Magistrate and close to the river. The land is occasionally flooded by the river, and in the ordinary way at high tide the river is only a foot or two below the level of the surface of the ground. The river is quite salt enough for the nipah palm to grow well on its banks.

It has been planted at Sitiawan, also on low land near the sea; at Tapah, Batu Gajah, in Kinta and other places in the State, and in all it has grown well.

It may therefore be stated that it will thrive in any locality, from the bakau swamps to the foot-hills, and on any soil, from rich alluvial to old mine heaps.

So far I have not noticed that it has any enemies which do it serious injury. When large areas come to be planted up there may arise trouble with some pest, but at present there does not appear to be any indication of such a contingency.

Hitherto the trees have been planted singly, and, as might be expected, they have grown with short trunks and bushy tops.

To be a success—that is, to yield large quantities of rubber—the tree must be planted so that it will run up and form a tall, straight, branchless trunk.

There is little to guide one on the subject, but from 15 to 20 feet apart would appear to be about the correct spacing.

At 20 feet it might be necessary to plant something in between to keep them from early branching, but this would not be necessary at 15 feet. In Larut, at an estate at Kampong Dew, they are being planted at 10 by 10 feet, that is, 435 per acre. It is very close, but it is the intention, I am informed by Mr. Waddell Boyd, the manager, to thin them out later on to 20 by 20 feet or 108 per acre, tapping the intermediate trees—that is, those which are ultimately to be thinned out—as early as possible and as severely as they will stand, while the others are allowed to grow to large size before tapping.

The greatest difficulty in planting Para is the very short time which the seed remains good after it falls from the tree. The time which elapses before they were planted should not under any circumstances be longer than a week, and if they can be planted before this so much the better. Sown at once nearly all germinate, but each day which intervenes increases the number of failures till, at the expiration of ten days or so, none grow.

Many methods have been suggested and tried for tapping the trees, but what may be called the herring-bone method appears to have advantages over the others. This is the way the Ipoh trees are tapped by the wild tribes of Perak and it is also used by the Malays for tapping trees yielding bird lime, etc. The American rubber collectors also adopt the same method for tapping Castilloa. In 1888-9 the trees, Para and Castilloa, at Kuala Kangsar were tapped by herring-bone cuts by Malays.

Federated Malay States Government Press.